Projecting Regional Population in the Middle of
an Economic Recession: Case of Southern California
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Abstract

Population projections play a key role in determining the future community needs including housing and transportation in a regional planning context. The assumption of existing population projections quickly became questionable due to the recent economic recession and the related economic uncertainty in the near future. The traditional long term perspective, which might not reflect the on-going economic trends and the frequently updated short term economic forecast, might result in the serious bias of the short term population projections. Using the recent experience of the Southern California Association of Governments (SCAG) in developing regional population projections, the study analyzes the sources of projection errors: 1) the unstable/uncertain nature of the key economic-demographic assumptions, in particular, unemployment rate and migration in the short term framework; 2) the currency and reasonableness of population projections (and assumptions) by US Census Bureau and CA Department of Finance (DOF); 3) a lack of relevant statistical data in a timely manner; and 4) the significant gap in population estimates between US Census Bureau and CA DOF. The study discusses a few ways of addressing projection errors and challenges. First, the short term population projections can be developed to properly reflect the on-going and plausible short term economic prospect. Second, the uncertainty of economic- demographic assumptions and prospects can be properly addressed through development of a range of population projections and the frequent and regular review of assumptions by a panel of experts. Third, the extrapolation of the region's historical pattern of demographic components (e.g., international migration) should also be considered important along with the demographic assumptions for the national population projections by the US Census Bureau. The regionally based bottom up demographic assumptions and projections might be a preferred practice because they might reflect the more realistic trend and short term outlook than the pure top down approach based demographic assumptions and projections. Fourth, employment forecast is useful in developing regional population projections. It provides regional planners with a persuasive growth story.

Keywords: Economic Recession, Population Projections, Migration, Uncertainty, Regional Planning, Southern California

1. Introduction

The late-2000s recession (or the Great Recession) was a severe economic recession that began in the United States in December 2007 and ended in June 2009 (as determined by the U.S. National Bureau of Economic Research)(http://en.wikipedia.org/wiki/Recession_of_2008). The after-impact continues and is hard to predict. There was a serious consideration of this economic recession on the regional employment and population projection process at SCAG. The paper discusses how to produce the reasonable short term and long term regional population projections through the panel of the expert meeting.

Population projections play a key role in determining the future community needs including housing and transportation in a regional planning context. Regional demographers and planners efficiently and regularly develop and update the future population growth using diverse data sources including US Census Bureau, State Statistical Agency, and private vendors. Those federal and state agencies do not frequently update their demographic assumptions, and sometimes might not maintain currency and reasonableness of population projections. We recently have experienced the unexpected economic recession beginning in December 2007 across the nation, which would affect the regional population growth, in particular, migration, in the near future. The assumption of existing population projections quickly becomes questionable due to the economic uncertainty in the near future. The traditional long term perspective, which might not reflect the on-going economic trends and the frequently updated short term economic forecast, might result in the serious bias of the short term and long term population projections.

A few important sources of population projection errors are identified as imperfect data on the demographic past and present, a limited understanding of demographic processes, and major events which are largely unpredictable (Wilson, 2009). Using the recent experience of the Southern California Association of Governments (SCAG) in developing the regional population projections as part of updating the 2012 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS), Regional Housing Needs Allocation (RHNA), the study analyzes several sources of projection errors observed during the recent population projections update process: 1) the unstable/uncertain nature of the key economic-demographic assumptions, in particular, unemployment rate and migration in the short term framework; 2) the currency and reasonableness of population projections (and assumptions) by US Census Bureau and CA Department of Finance (DOF); 3) a lack of relevant statistical data in a timely manner; and 4) the significant gap in population estimates between US Census Bureau and CA DOF.

The study discusses a few ways of addressing the projections errors. First, the short term (5-10 year) population projections can be developed to properly reflect the on-going and plausible short term economic prospect. Second, the uncertainty of economic-demographic assumptions and prospects can be properly addressed through development of a range of population projections and the frequent and regular review of assumptions by a panel of experts. Third, the extrapolation of the region's historical pattern of demographic components (e.g., international migration) should also be considered important along with the demographic assumptions for the national population projections by the US Census Bureau. The regionally based bottom up demographic assumptions and projections might be the better practice because they might reflect the more realistic trend and short term outlook than the pure top down approach based demographic assumptions and projections. Fourth, employment forecast is useful in developing regional population projections. It provides regional planners with a persuasive growth story.

The study also identifies the future challenges in a regional planning framework. First, SCAG is required to meet diverse federal and state planning and regulatory requirements (e.g., currency, consistency) for developing reasonable regional population projections. Second, SCAG should promote public involvement and participation during the population projection process, while maintaining the accuracy of the regional population projections. Both promoting the active public involvement and maintaining the accuracy of the regional population projections are not separate but integrated planning goals in a regional planning framework.

In the following chapters, the study will cover: 1) economic recession and population projections: projection errors; 2) uncertainty in regional economic and population projections and expert opinion; 3) regional population projection model: methods and assumptions; 4) discussion and conclusions.

II. Economic Recession and Population Projections: Projection Errors

Southern California Association of Governments (SCAG) is the largest of nearly 700 councils of government in the United States, functioning as the Metropolitan Planning Organization for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. The region encompasses a population exceeding 18 million persons in an area of more than 38,000 square miles (See figure 1). As the designated Metropolitan Planning Organization, the SCAG is mandated by the federal and state governments to research and draw up plans for transportation, growth management, hazardous waste management, and air quality, housing, hazardous waste management, and waste treatment management. SCAG also acts as an information clearinghouse,

providing cities and counties a wide array of demographics, forecasting, mapping and other regional statistics and data.

[Insert Figure 1 about here]

In February 2009 SCAG officially launched its growth forecast process. At the point, the SCAG region was heavily hit by the national economic recession (probably the greatest recession since the great depression!), which formally started in the late 2007. One of the key causes of the recession was the sub-prime loan losses and their impact on other risky loans and over-inflated asset prices (http://en.wikipedia.org/wiki/Late_2000s_recession). The SCAG region's foreclosure data during the period of 2007-2008 reflects the impact of the sub-prime loan losses (Dataquick, 2008). The number of the regional foreclosed units increased from 3,779 units in July 2007 to 12,734 units in August 2008 by 237%.

[Insert Figure 2 about here]

The recent economic recession was so severe that we were uncertain about the near term economic outlook (size of job loss, affected jobs by sector, labor force adjustment, and unemployment rate, etc) and its related population impact. A couple of economic indicators, unemployment rate and job growth rate, are popular ways of measuring the economic condition. The two economic indicators are projected by well-known government agencies and private consulting firms (See table 1). According to table 1, several agencies projected the short term unemployment rate for different levels of geography: nation, state, and county. Nine agencies developed the national level unemployment rate. Although two federal agencies (Federal Reserves Governors and President and OMB) expected the national unemployment rate will be highest in 2009, other seven agencies predict the highest unemployment rate in the nation to occur in 2010. It seems that there is consensus on the perspective of the short term California State's unemployment rate. All of four agencies forecast that the California State's unemployment rate is highest in 2010. Table 1 includes only one agency's short term forecast of the unemployment rate of four counties in the SCAG region. Four counties in the SCAG region are projected to show the highest unemployment rate in 2010.

[Insert Table 1 about here]

In most of metropolitan regions, the long term regional transportation plan is usually updated every three or four years as required by the federal law. The regularly updated regional plan

likely reflects the current and updated planning indicators. Population projections, as a key indicator to determine future travel demand, are also revised upward or downward according to the recent trend or the updated expectation of the future population growth.

When a metropolitan region is required to update the population projections during the economic recession, it immediately faces a few issues and challenges in moving forward population projections process. First, there is lack of timely information of the relevant historical population trends, including components of growth (e.g., births, deaths, and migration). In particular, information of the regional birth rate, death rate, or migration rate by demographic characteristics is not available on time. The mid year county population estimates and components of population change are oftentimes available due to the processing time of administrative records 6 months to 11 months later, and are updated on an annual basis. The update of these demographic is based on administrative records of 17 state and federal departments and agencies (CA DOF, 2009).
(http://www.dof.ca.gov/research/demographic/reports/estimates/e-2/2000-09/). Due to the delay of the data availability, we might miss the significant demographic changes to occur in turbulent economic condition.

Second, economic-demographic behaviors (e.g., unemployment rate, labor force participation rate, multiple jobholding rate) might be out of the normal range in the short term framework (Campbell, 2008). In particular, unemployment rate in the economic recession is extremely high that the population projection model should be able to reflect its impact on migration in the short term projection.

Third, there is a significant gap in population estimates between US Census Bureau and CA DOF (Wheaton, 2009). According to the Census Bureau's July 2008 estimate for the SCAG region is 17,950,391, while CA DOF's estimate of population is 18,648,406. The Census Bureau's estimate of population is 698,015 persons, 3.9% lower than that of CA DOF. As expected, the major reason for the discrepancy is the estimation of domestic migration. Both agencies use different data bases to estimate domestic migration. The US Census Bureau mainly uses federal tax returns for tax filers to measure migration, while CA DOF mainly uses the licensed driver's address change. The size of the difference is varying by county. Los Angeles County (485,388) showed the most significant numerical difference in the population estimate between US Census Bureau and CA DOF. Other Counties also showed a numerical difference: Orange (114,997), San Bernardino (45,367), Ventura (32,605), Imperial (13,848), Riverside (5,812). In terms of the percent change, Imperial County showed the most significant difference (8.4%). Other counties'

percent change is as follows: Los Angeles (4.9%), Ventura (4.1%), Orange (3.8%), San Bernardino (2.3%), Riverside (0.3%).

Fourth, the existing population projections and related demographic assumptions by US Census Bureau (2008) or CA DOF (2007) might be outdated and should be carefully reviewed for its currency and reasonableness. For example, US Census Bureau's international migration were developed using historical time series information. As with past projections, the international migration assumptions forecast for this series are not constrained to any current or proposed policy or administratively determined immigration levels. (US Census Bureau, 2008)(http://www.census.gov/population/www/projections/methodstatement.html). Total annual average of net international immigration is projected to be 1,338,400 (2010-15), 1,434,400 (2015-20), 1,530,200 (2020-25), 1,626,000 (2025-30), 1,721,600 (2030-35). The projected immigration is much higher than that of the recent historical tends (945,000 per year). As of writing this paper, the US Census Bureau (2009) released the supplementary population projections with alternative net international migration assumptions.

III. Uncertainty in Regional Economic and Population Projections and Expert Opinion

The SCAG regional job projections are developed using the shift-share method, and the regional population projections are derived using the cohort-component model reflecting the constraint by the projected employment (SCAG, 2008). The key steps and concepts for developing the regional job and population projections are described as follows (Levy, 2009): First, the regional job growth projections depend on the number and type of jobs created in the nation and the regional share of these jobs located in the nation and California. Second, the number of jobs in the U.S. depends on the growth in total population and population by age group and projections of labor force participation rates. Unemployment rates and the number of workers holding more than one job are also contributing factors in determining long-term U.S. job growth. Third, projected regional job growth determines regional labor force and workers demand, which will affect labor force and workers supply through mainly migration. Regional population projections are derived as a result of this labor demand-supply balance process.

In the rapidly changing and volatile economic environment, the usual economic and population projection models do not produce the reasonable projections, in particular, the short term projections due to the unstable nature of the economic and demographic assumptions. The average approach (e.g., average of the newly available economic or demographic projections) might be a preferred approach toward updating the new short term economic and demographic

projections (Smith et al, 2001). The timely developed private sources of the near term or long term economic and demographic projections are available with a cost, although the demographic projections tend to rely on the most recent series of projections by the U.S. census Bureau or the state statistical agency. The collective expert opinion might be a useful reference to reduce the short term and long term projections errors. In the following, I summarize the expert opinion on critical factors and key economic and demographic assumptions through two panels of experts meeting discussed in May 2009 and May 2010. As a result, we expected to have a reasonable range of population projections.

1. The Panel of Experts Meeting I

A first panel of experts meeting was held on May 15, 2009. A panel of experts is comprised of fifteen experts in the field of regional and national economy and demography. These experts might have worked on economic or demographic forecasts for a long time or the agencies that they work for might have produced economic or demographic forecasts. They come from a variety of public or private organizations. Nearly 50% of the panel members come from the Universities in California (e.g., University of Southern California, University of California Los Angeles, University of California Riverside, University of California Santa Barbara, California State University Long Beach, California State University Fullerton). Other panel members come from the state or local government agencies, private consulting firms (e.g., Los Angeles Economic Development Corporation, South Coast Air Quality management District, California Department of Finance, Regional Economic Models, Inc., Beacon Economics, DB Consulting). Experts were provided with a list of questions regarding assumptions with background information (e.g., historical data and preliminary range of forecast by moderator) a few days before the panel of experts meeting.

The survey questions focused on three major aspects of job and population projections: 1) short term economic outlook; 2) long term economic assumptions (e.g., regional share of the national job projections, retirement age of workers, labor force participation rate); 3) long term demographic assumptions (e.g., fertility rate, life expectancy, and net international immigration).(See table 2). The survey questions include, not limited to: 1. How deep and long will the recession be? How will the recession affect the economy and prospects for housing in 2020?; 2. After the recession ends, will national job growth be equal to, greater than, or less than the U.S. job growth rate from the current U.S. BLS projection?; 3. Will workers retire at an older age in 2020/2035 than now?; 4. How does the California's share of U.S. jobs change in the future?; 5. How does the SCAG region's share of California jobs change in the future?; 6. How

does the panel evaluate the new Census Bureau U.S. population projections and related assumptions of fertility rates, life expectancy, and international immigration?; 7.Will labor force participation rates continue to increase for older workers?

[Insert Table 2 about here]

First, the short term economic outlook is focused on understanding the timing of the bottom of the national and regional economic recession. According to the responses of the experts, the economic recession measured in job losses in the SCAG Region would most likely end in 2010 (2 respondents), 2011(7 respondents), or 2012(3 respondents). Once the economy is recovered from the recession, it might take several years for the unemployment rates to be back to a normal range (5% - 8%). Five of seven responded that, after the recession ends, regional job growth would be equal to the annual average of U.S. job growth rate (1.04% between 2006 and 2016) from the current 2007 US BLS job projection. Two respondents said that the regional job growth would be greater than the U.S. job growth rate from the current 2007 US BLS job projection.

Second, the regional share of the national job projections is surveyed through two different but related questions about 1) California's share of U.S. jobs for 2020 and 2035 and 2) SCAG Region's share of California jobs for 2020 and 2035. Twelve experts responded to both questions above. The survey results imply that the regional share of the national job projection ranges from 4.3% (minimum) to 5.3% (maximum) in 2020 and 3.8% (minimum) to 5.5% (maximum) in 2035 (See table 2). The gap between the minimum and maximum is much bigger in 2035 than in 2020. The median regional share remains constant at 5% for both 2020 and 2035, which is 0.2% point lower than the most current regional share (5.2%). The overall survey response is not optimistic about the SCAG region's relative economic competiveness in the national economy, although the survey questions did not directly touch on "the regional share of the national job growth.". The labor force participation rate (retirement) trends in the SCAG region will be consistent with the national projection, and will support that workers in the region tend to retire at an older age in the future,

Third, there is no or little concern about the national and regional assumptions of the future fertility rates and the life expectancy. The current regional average total fertility rate of 2.1 is assumed to slightly decline to 2.0 and 1.9 in 2020 and 2035, respectively, during the projection period. The regional life expectancy will increase along the national life expectancy's increase during the projection period. The national immigration assumptions are major concerns of the panel members. In fact, the Census Bureau released one set of long-term population projections

for the nation in August 2008. These baseline projections included higher immigration projections than previously, which resulted in an increase in projected population growth to 2050. The key question is whether SCAG will adjust the current international immigration upward in light of the higher Census Bureau projections. Ten of the thirteen panel members said No to the upward adjustment of the international immigration assumption.

2. The Panel of Experts Meeting II

Two major projections from the US Census Bureau and US Bureau of Labor Statistics (BLS) were released since the previous year's panel of the expert meeting. In December 2009, US Census Bureau released alternative sets of population projections with different immigration assumptions. The 2009 national population projections are a supplemental series to the 2008 national population projections released on August 14, 2008, and provide results for differing assumptions of net international migration (http://www.census.gov/population/www/projections/2009projections.html). All other methodology and assumptions, including mortality and fertility, are the same as those used in the 2008 national population projections. The lower immigration assumption, which looks reasonable in light of the recent trends, results in lower national population. When compared with the baseline projections released in August 2008, the gap between the low migration alternative and the baseline is 4.5 million (1.3%) in 2020, 9.7 million (2.5%) in 2035. in December 2009, BLS released the new job projections to 2018. These projections were based on the national population projections released by the U.S Census Bureau in August 2008. Since there is only 1.3% difference in 2020 population between the low migration alternative and the baseline, the potential impact of the new low immigration alternative on job projections would be negligible. International immigration, in particular, unauthorized immigrants show a rapid decline from 11.8 million in 2007 to 11.6 million in 2008, and to 10.8 million in 2009. The decline in just one year between 2008 and 2009 reaches 800,000, which would be the likely impact of the recent economic recession.

A second panel of experts meeting was held on May 28, 2010, just one year after the first meeting held in 2009. Panel members, who participated in the first panel of expert meeting, were invited to the second panel of experts meeting. Eleven members attended the meeting to: 1) revisit the potential impact of economic recession and recovery in the national economy on the regional economy; 2) provide input on the recent trends in immigration and the U.S. population growth; 3) review the recent trends in the region's share of the national jobs.

With those newly available data in mind, the panel members participating in the second panel of experts meeting provided input to SCAG staff. First, the panel thought that job losses in the region would end in 2010 or 2011 in the previous year's panel of experts meeting. While panel members differed on the size and timing of recovery, the panel did not think the recession would affect the size of the region in 2020 and 2035. Some panel members thought there could be lingering impact on unemployment rates, income growth and housing markets. Second, U.S. population growth affects the pool of people and jobs in the nation. For any given SCAG share of future growth, higher U.S. immigration and population growth will push the SCAG region growth higher and vice versa. U.S. immigration and population growth is likely to be maintained at the lower level for the next 5 to 10 years. Third, job shares dropped in 2008 and 2009, and state and regional job losses were larger than in the U.S. The majority of panel members supported the downward revisions of the regional shares of the national jobs. We are not sure if these declines in the regional job shares are temporary, based on the sharp decline in construction. There is a possibility that these declines might be a permanent shift because of the result of the long term demographic trends toward aging of population, or because of the lack of the timely development and implementation of economic growth policy and strategy.

IV. Scenarios of Economic Recovery and A Range of Population Projections

1. Regional Population Projection Model

Population projections are required as key input to develop federal and state mandated plans and programs. Employment projections are also developed along with population projections because of their importance in developing regional economic strategy and measuring traffic attractiveness of the destination areas. As a result, the future population and employment size should be determined considering the relationship of two variables. An example is to use population to employment (P/E) ratio to develop population or employment projections. The P/E ratio can be effectively used to link population to employment.

Given the requirements of developing both population and employment projections, SCAG has developed a type of economic-demographic models. The following is a brief description of SCAG regional population projection model (SCAG, 1998) (See figure 3).

[Insert Figure 3 about here]

Two major components (five minor components: births, deaths, net international immigration,

domestic in-migration, domestic out-migration) account for population growth: natural increase (which is the balance between births and deaths) and net migration (which is the balance between the number of people coming and leaving the region). Net migration is further divided into three components: domestic in-migrants (people moving into the region from the rest of the country), domestic out-migrants (people moving into the rest of the country from the region), and net international immigrants (legal and unauthorized immigrants minus legal and unauthorized international emigrants).

SCAG initially develops regional population projections using the cohort-component model. The model computes the population at the future point in time by adding to the existing population the number of group quarters population, births and persons moving into the region during a projection period, and by subtracting the number of deaths and the number of persons moving out of the region. Two region gross migration approach is used to develop two domestic migration components for its theoretical soundness, less data needs, and easy applicability (Isserman, 1993). This process is represented as the demographic balancing equation.

$$P_t = P_0 + B - D + DIM - DOM + NIM$$

where P_t is the population at time t, P_0 is the population at time 0, B is births between times 0 and 1, D is deaths between times 0 and 1, DIM is domestic in-migrants, DOM is domestic out-migrants, and NIM is net international migrants.

The fertility, mortality and migration rates are projected in five year intervals for eighteen age groups, for two sexes, for four mutually exclusive ethnic groups: Non-Hispanic White, Non-Hispanic Black, Non-Hispanic Asian and Others, and Hispanic. The birth rates are also projected by population classes: residents (domestic migrants) and international immigrants. The regional migrations are derived using: 1) three component approach (domestic in-migration, domestic out-migration, net international migration), 2) structural model for domestic migration, extrapolation for international migration, 3) bottom-up model linked to employment assumptions, and 4) two region gross migration model. The future labor force supply is computed from the population projection mode by multiplying civilian resident population by projected labor force participation rates. This labor force supply is compared to the labor force demand based on the number of jobs by the shift share employment projection model. The labor force demand is derived using three step processes. The first step is to develop independent job projections using diverse economic models, including export-base models, input-output models, or shift-share techniques (Smith et al, 2001). The second step is to convert jobs into workers using the worker

to job ratio. The application of the worker to job ratio is intended to reflect the proportion of workers holding two jobs or more. The third step is to convert workers into labor force demand using the ideal implied unemployment rate. If any imbalance occurs between labor force demand and labor force supply, it is corrected by adjusting the migration assumptions of the population projection model. This kind of equilibrium model is relatively less costly and easy to implement (George et al, 2004). Adjustment of migration assumption is translated into total population changes using the established conversion ratio.

2. Updated 2010 Employment Estimate and Economic Recovery Scenario

According to the recent employment estimates from California Employment Development Department (EDD) in October 2010, the regional job projections for years 2009 and 2010 used in the existing employment projection model are 250,000 higher than the recent estimates, respectively. The actual growth rates of jobs for 2008-2009 and 2009-2010 are -6.5% and -1.8%, respectively. In particular, the actual growth rate of -6.5% for 2008-2009 is much lower than the projected job growth of -3.3% for 2008-2009. The regional jobs showed a loss of 800,000 jobs from 8 million jobs (highest level in the SCAG economic history) in 2007, to 7.3 million jobs in 2009, and to 7.2 million jobs in 2010 between 2007 and 2010 (See figures 4-A and 4-B).

[Insert Figures 4-A and 4-B about here]

The updated employment estimates for 2010 and related employment projection update needs to update the existing employment projections and would have an implication for the population growth projections. The update of employment projection update would depend on the new base year estimate (2010) and the different scenarios of economic recovery. The scenario approach is used to understand the economic recovery scenarios and their impact on jobs and population,

This study develops three alternative scenarios of economic recovery in light of employment growth with updated 2010 employment estimates for demonstration (See table 3). First, S10-1 employment projections are based on the annual employment growth rate (2010-2035) from the 2009 regional employment projections (S09) released in August 2009. The employment growth pattern (e.g., the annual growth rate between 2010 and 2035) remains the same as the 2009 employment projections (S09). According to this economic recovery scenario, the loss of 250,000 jobs between for 2009-2010 will not be recovered during the projection period (2010-2035). Second, S10-2 employment projections are based on the assumption that the economic recovery occurs in 2016, then maintains the annual growth rate (2016-2035) of the 2009 regional

employment projections (S09). The loss of 250,000 jobs between for 2009-2010 will be recovered until 2016, when the economic recovery is completed. Third, S10-3 employment projections are based on the assumption that the economic recovery occurs in 2021, then maintains the annual growth rate (2021-2035) of the 2009 regional employment projections (S09). The loss of 250,000 jobs between for 2009-2010 will be recovered until 2021, when the economic recovery is completed.

The resulting employment projections of three sets of three different economic recovery range from 7.8 million to 8.5 million in 2015, from 8.2 million to 9.2 million in 2020, and from 9.1 million to 10.4 million in 2035. Focusing on the base case of three alternative employment projections, each of three base case scenarios shows the differing growth rate for three different projection period: 2010-2015, 2015-2020, and 2020-2035. Three base case scenarios show an overall declining growth rate from the early projection period (2010-2015) to the late projection period (2020-2035). The S10-1 base case scenario (consistent with the growth pattern of S09 between 2010 and 2035) shows an annual growth arte of 2.0% (2010-2015), 1.3% (2015-2020), and 0.8% (2020-2035). The S10-2 base case scenario (complete economic recovery in 2016) shows an annual growth arte of 2.7% (2010-2015), 1.4% (2015-2020), and 0.8% (2020-2035). Although the S10-2 base case scenario shows a fast annual growth between 2010 and 2015 than the S10-1 base case scenario, the two base case scenarios' growth pattern of 2015-2020 and 2020-2035 looks similar. S10-2 base case scenario's annual growth of 2.7 percent for 2010-2015 is highest among three alternative economic recovery and employment projections. The S10-3 base case scenario (complete economic recovery in 2021) shows an annual growth rate of 2.0% (2010-2015), 1.3% (2015-2020), and 1.1% (2020-2035). The growth pattern of the next five years is similar to that of S10-1, but the growth rate of 2020-2035 is higher than both S10-1 and S10-2. The S10-3 base case scenario looks optimistic in light of the potential job impact of the long term population aging. I am not sure if the loss of 250,000 jobs during the period of 2009-2010 might be fully recovered to the previous year's projection level during the projection period. Considering the uncertain near future of job trends and the long term population aging, S10-1 base case scenario and related low and high scenarios might be a plausible range of scenario among three alternative economic recovery and employment projection scenarios.

[Insert Table 3 about here]

3. A Range of Population Projection

With a range of regional job projections given the economic recovery scenario, the cohort

component model is used to produce a range of the regional population projections. Domestic migration flows between the region and the rest of the nation would be adjusted to achieve the balance between regional population and regional employment. All of other demographic and economic assumptions on fertility, life expectancy, foreign immigration, labor force participation rate, unemployment rate, and the double jobbing rate remain the same for three alternative scenarios (See table 4).

[Insert Table 4 about here]

The resulting population projections of three sets of three different economic recovery range from 19.2 million to 20.7 million in 2015, from 20.1 million to 22 million in 2020, and from 22.4 million to 25.1 million in 2035 (See table 5). Focusing on the base case of three alternative population projections, each of three base case scenarios shows the differing growth rate for three different projection period: 2010-2015, 2015-2020, and 2020-2035. In contrast to trends of employment projections, three base case scenarios of population projections do not show an overall declining growth rate from the early projection period (2010-2015) to the late projection period (2020-2035), but shows a completely different pattern of growth pattern. The S10-1 base case scenario (consistent with the growth pattern of S09 between 2010 and 2035) shows an annual growth arte of 0.7% (2010-2015), 1.0% (2015-2020), and 0.8% (2020-2035). The population growth is restrained due to the immediate impact of economic recession and economic recovery. The regional implied unemployment rate improves from 12% in 2010 to 8% in 2015, and the residents of the region would be able to take advantage of the job opportunities, while the domestic in-migrants might not be needed to accommodate the job growth. As a result, there is no pressure for population growth relative to job growth during 2010-2015. However, the annual growth of approximately 120,000 people would be recorded the lowest in the recent few decades. The S10-2 base case scenario (complete economic recovery in 2016) shows an annual growth arte of 1.2% (2010-2015), 1.0% (2015-2020), and 0.8% (2020-2035). The S10-2 base case scenario shows a fast annual growth between 2010 and 2015 than the S10-1 base case scenario, while the two base case scenarios' growth pattern of 2015-2020 and 2020-2035 looks similar. S10-2 base case scenario's annual growth of 1.2 percent for 2010-2015 is highest among three alternative population projections. The relatively fast economic recovery and job growth pattern relative to other alternative population projections pushed the population growth in 2010-2015 upward. The annual growth of approximately 220,000 people for 2010-2015 would be a little higher than in recent few years, but much lower than that of early 2000s, when approximately 300,000 people were annually added to the region between 2000 and 2005. The S10-3 base case scenario (complete economic recovery in 2021) shows an annual growth rate of

0.7% (2010-2015), 1.0% (2015-2020), and 1.1% (2020-2035). The growth pattern of the next five years is similar to that of S10-1, but the growth rate of 2020-2035 is higher than both S10-1 and S10-2. The S10-3 base case scenario reflects the consistent economic growth from the longer term perspective.

The S10-1 base case scenario and related low and high scenarios might be a plausible range of scenario among three alternative population projections with caution. In particular, the population growth of the period 2010-2015 is too low in light of the historical pattern, and probably might underestimate the inertia of the regional population growth due to the nature of the economic-demographic modeling practice. Probably, in a real world, a small change in the existing regional demographic assumptions such as reduction of unemployment rate from 8% to 6%-7% might allow for more population growth. The DOF population projections released in 2007 are comparable to the S10-1 high scenario. The DOF population projections are based on the traditional cohort-component model and tend to reflect the recent demographic trends with no or little consideration of employment projections. As shown in table xx, we might need the high scenario of employment growth: 8.2 million jobs in 2015, 8.9 million jobs, and 10.1 million jobs in 2035, to accommodate the DOF population projections.

[Insert Table 5 about here]

V. Discussion and Conclusions

While the economic recession officially began in December 2007 and has been getting more serious over the year with no clear sign of economic recovery in light of jobs, SCAG region has been hit hard with loss of jobs and high unemployment rate. In February 2009, SCAG, as the largest MPO in the nation, began updating the existing population projections for diverse regional planning activities including regional transportation plan (RTP), regional housing needs allocation (RHNA), sustainable communities strategy (SCS), etc.

Unlike the routine update of the regional population projections in the context of usual economic or business environment, the serious economic recession increased the uncertainty of the immediate future economic outlook for job growth, unemployment rate, and population growth through migration. What would be the best practice of developing the reasonable regional population projections? The uncertain and gloomy economic outlook will influence the population projections through mainly domestic migration and partly international migration. There are several challenges and proposed regional approach to population projections. First, the

first major challenge is to develop the reasonable short term economic prospect for job growth, unemployment rate, and population growth. A range of the short term economic outlooks (e.g., job growth rate, unemployment rate) could be identified from a list of economic forecasts, a panel of expert meeting, and expert interview.

Second, there is need to reassess the traditional top down approach and to promote the bottom up approach. In a usual projection environment, diverse demographic estimates, assumptions, and projections from the federal and state governments are widely used as a reference or a guide. They are of limited help in such an uncertain economic environment. The recent demographic data plays a limited role in understanding the immediate future status through the rapidly changing economic environment due to unavailability of the timely data base. The currently available demographic assumptions and projections by the US Census Bureau, US Bureau of Labor Statistics, and CA DOF are also of limited use because they are already outdated or overestimated, and might need to be updated. Instead of fully relying on the authoritative federal and state data sources, the regional planning agencies might need to be selective in using them and creative in interpreting the forces underlying the current economic recession and demographic changes. The regionally based bottom up demographic assumptions and projections might be the better practice because they might reflect the more realistic trend and short term outlook than the pure top down approach based demographic assumptions and projections. The successful example of using the bottom up approach is CA DOF's current practice of developing migration assumptions. California Department of Finance Demographic Research Unit (DOF) is designated as the single official source of demographic data for state planning and budgeting (http://www.dof.ca.gov/research/). The DOF develops population projections for the State and the counties for 50 year projection horizon. The population projections are developed using the cohort-component model and are available for age, sex, and race/ethnic groups. It is worth noting that the DOF depends on local input to develop county level net migration assumptions. Local input is usually provided by local or regional planners or demographers of local jurisdictions, COGs, MPOs in California. The local input process significantly reduced the gap in the long term population projections. For example, the most recent DOF population projections (July 2007) for the SCAG region were 24.3 million in 2035, while the SCAG regional population projections (July 2007) were 24 million in 2035 (See tables 6A-6D). The difference in regional population projections was only 277,000 at 1.2%. While there is a wide variation of the difference in population projections by county, the regional difference was extremely low, considering that the typical mean absolute percent error for 30 year population projections at the State level is eighteen percent (Smith et al, 2001, p.340). The major cause of such small gap in population projections between SCAG and DOF must be related to the local input process that

DOF uses to develop the net migration assumptions.

[Insert Tables 6A-6D about here]

The study identifies the future challenges in a regional planning framework. First, SCAG is required to meet diverse federal and state planning and regulatory requirements (e.g., currency, consistency) for developing reasonable regional population projections. According to the federal transportation and air quality law, the SCAG is required to use the most "current" planning assumptions to develop the regional transportation plan. The currency requirement is not specifically defined in the law, but might be applied to the whole planning process and might be interpreted in a broad way. When this currency requirement is applied to the population projection process, demographic assumptions used for population projections should readily reflect the recent trend and the plausible growth trajectory. The reasonable and realistic demographic assumptions are easily found to be true or false within a short time period. In addition to the currency requirement, the "consistency" requirement is also an important consideration for developing demographic assumptions in a regional planning framework. The first example is California Senate Bill 375 enacted in 2008. The SB 375 is an implementation law of AB 32 – the Global Warming Solution Act of 2006. SB 375 integrates three key planning elements: SCS, RTP, and RHNA to achieve the regional GHG emissions target, and one set of demographic assumptions and population projections are required to consistently serve the above planning activities. The long-term transportation plan (planning horizon of minimum 20 years) and the short term housing needs allocation plan (8 year planning horizon) are linked each other through SCS and prepared on the "same" planning cycle (every four years). Once these two different temporal perspectives (e.g., short term and long term) can be discussed together on the same planning cycle, the demographic assumptions and population projections might be dealt with in a more integrated way. The second example is a potential reconciliation process of population projections during the RHNA process. The reconciliation occurs if there is a significant difference in population projections between SCAG and DOF during the RHNA process. For example, if the total regional population growth of both agencies for the planning period (8.5 years) is within a range of 3 percent, SCAG's population projections for RTP shall be the basis for calculating projected housing need in the region. If the total regional population growth of both agencies for the planning period is greater than 3 percent, SCAG will further discuss HCD on an appropriate methodology. If there is still no agreement SCAG and HCD, then HCD bases the RHNA on the DOF projections, but may modify the projections as a result of its discussions with SCAG.

Second, SCAG should promote public involvement and participation during the population projection process, while maintaining the accuracy of the regional population projections. Public involvement and participation is vital to the regional planning process. Participation by local jurisdictions, the general public, the business community, community groups, and other governmental agencies is encouraged during the forecast and planning process. Public participation should be a proactive and meaningful public involvement process, including access to complete technical and policy information, timely notices, full access to key decisions, and support for early and continuing involvement in regional population projection development.

The public outreach is part of developing a reasonable population projection at different levels of geography in a regional planning framework. As part of developing a growth forecast for 2012 Regional Transportation Plan, SCAG conducted the local input process between August 2009 and October 2009 to get growth projection input from local jurisdictions. When asked for an input on small area population projection during the recent growth forecast outreach process, a local planner asked about an ideal accuracy level of the 27 year population projection (2008-2035) at the census tract or transportation analysis zone level. The local planner already knew the high uncertainty level of the small area projection, and was comfortable in providing his input on growth projection after confirming that the typical mean absolute projections errors (MAPE) might be very high at approximately 50% according to demographers (Smith et al, 2001, pp. 339-340). As the smaller geography or the smaller population size generates the higher forecasting uncertainty, the longer projection horizon also does the higher forecasting uncertainty.

Table 6 calculates the forecasting accuracy of regional population and employment projections in the SCAG region using MAPE as of 2008. SCAG has produced 11 series of the regional population and employment projections since the early 1970s, and the projection results were compared with the available estimates from CA DOF and California Employment Development Department (EDD). The MAPEs of the regional population projections are higher with the longer length of projection horizon, and is consistent with the typical MAPEs for population projections at the State level (Smith, Tayman, Swanson, 2001, p. 340). The MAPEs of the regional employment projections are overall higher than those of the regional population projections, and are higher with the longer length of projection horizon, except for the 20 year projection horizon. Regional employment projection for the year 2000 in the SCAG, SCAG82 Growth Forecast Policy (adopted in October 1982) was 7.6 million jobs, while the 2000 employment estimates were 7.4 million jobs. The margin of errors for the 20 year employment projection was very low at approximately 3%, which has improved the overall accuracy of the 20 year employment projection from the possibly 15% MAPE to 8% MAPE.

[Insert Table 7 about here]

As observed in table 7, the SCAG regional population projections are overall found reasonable and accurate and are within an acceptable range of errors. Probably the regular update of the regional population projections every three or four years might have helped in avoiding the further enlargement of the errors. The population projection does not usually become an issue during the normal economic condition. In the economic recession, local communities are financially affected by a lack of building permits and housing construction and loss of retail and service sector jobs. In particular, the serious set back of the building permits is easily translated into lower population projections in terms of both the short term and long term perspectives. Economic aspects are naturally embedded in the discussion of components of population growth, and used to develop a coherent growth story of the local jurisdictions, subregions, and the region.

Both promoting the active public involvement and maintaining the accuracy of the regional population projections are not separate but integrated planning goals in a regional planning framework.

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[List of Tables and Figures]

Table 1. Survey of Economic Outlook/Forecasts

Survey of Economic Outlook/Forecasts												
Forecast/Outlook for the U.S.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Unemployment rate												
Federal Reserve Governors & Presidents		8.65%	8.15%	7.10%	(Longer run: between 4.8% to 5.0%)							
OMB	5.80%	8.10%	7.90%	7.10%	6.00%	5.20%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
CBO	5.70%	8.30%	9.00%	8.00%	6.80%	5.80%	5.10%	4.90%	4.80%	4.80%	4.80%	4.80%
February Bluechip Consensus	5.80%	8.30%	8.70%	5.80%	5.50%	5.30%	5.20%	5.10%	5.10%	5.10%	5.10%	5.10%
UCLA Anderson Forecast (3/25/09)	5.80%	9.20%	10.40%	9.80%								
UC Santa Barbara Economic Forecast	5.80%	9.70%	10.90%	10.30%								
Governor's Budget 2009-10, Revised May 2009	5.80%	9.10%	10.20%	9.60%								
Beacon Economics	5.77%	9.03%	9.66%	8.33%	6.86%	5.91%	5.36%	4.96%				
LA EDC	5.80%	8.70%	9.50%									
Non-farm job growth												
UCLA Anderson Forecast (3/25/09)	-0.40%	-3.60%	-1.00%	1.50%								
UC Santa Barbara Economic Forecast	-0.30%	-3.60%	-2.40%	0.00%								
Governor's Budget 2009-10, Revised May 2009	-0.40%	-3.60%	-0.80%	1.50%								
LA EDC	-0.30%	-3.20%	-0.90%									
Beacon Economics	-0.35%	-3.88%	-1.72%	2.11%	3.44%	2.87%	2.07%	1.71%				
Economy.com	-0.40%	-3.66%	-0.37%	2.70%	3.60%	3.31%	1.09%	0.60%	0.70%	0.76%	0.73%	0.70%
Forecast/Outlook for California												
Unemployment rate												
UCLA Anderson Forecast (3/25/09)	7.20%	11.00%	11.70%	10.80%								
UC Santa Barbara Economic Forecast	7.20%	12.00%	13.80%	13.00%								
Governor's Budget 2009-10, Revised May 2009	7.20%	11.10%	12.00%	11.30%								
LA EDC	7.20%	10.50%	11.70%									
Beacon Economics	7.24%	11.12%	12.66%	11.23%	8.86%	7.00%	5.87%	5.24%				
Non-farm job growth												
UCLA Anderson Forecast (3/25/09)	-1.20%	-4.10%	-1.00%	1.70%								
UC Santa Barbara Economic Forecast	-1.10%	-4.80%	-2.80%	0.10%								
California Economic Forecast	-1.16%	-4.14%	-1.00%	1.74%	1.89%	1.53%	1.34%	1.25%				
Governor's Budget 2009-10, Revised May 2009	-1.20%	-3.90%	-0.90%	1.60%								
LA EDC		-3.00%	-1.00%									
Beacon Economics	-1.14%	-3.81%	-2.29%	0.64%	2.84%	3.40%	3.09%	3.00%				
Economy.com	-1.08%	-3.73%	-0.58%	2.41%	3.33%	2.53%	0.92%	0.51%	0.57%	0.60%	0.58%	0.57%
Forecast/Outlook for SCAG Region												
Non-farm job growth												
LA EDC												
5-county area	-1.07%	-2.54%	-1.46%									
Los Angeles	-0.43%	-2.17%	-1.62%									
Orange	-1.94%	-2.91%	-0.86%									
Riv/SB	-1.84%	-3.16%	-1.59%									
Ventura	-2.16%	-3.25%	-1.75%									
CSU-Long Beach												
5-county area	-1.90%	-1.50%	-0.90%	0.30%								
Los Angeles	-1.30%	-1.30%	-0.80%	-0.10%								
Orange	-2.00%	-1.20%	-0.40%	1.40%								
Riv/SB	-3.80%	-2.60%	-1.70%	0.30%								
Ventura	-2.50%	-1.30%	-0.10%	1.00%								
California Economic Forecast												
Los Angeles	-1.28%	-5.05%	-1.73%	2.53%	4.06%	2.47%	0.40%	0.08%				
Orange	-2.04%	-2.72%	-0.46%	1.70%	1.74%	1.69%	1.33%	1.17%				
Ventura	-2.17%	-2.79%	-0.74%	1.09%	1.12%	1.59%	1.76%	1.75%				
UC Santa Barbara Economic Forecast												
Los Angeles	-1.30%	-6.40%	-4.00%	-0.30%								
Dr. John Husing Forecast												
Riv/SB		-6.70%										
Economy.com												
6-county area	-1.87%	-5.22%	-1.14%	2.71%	3.98%	2.72%	0.70%	0.35%	0.51%	0.49%	0.42%	0.44%
Beacon Economics												
Los Angeles	-1.27%	-3.67%	-1.95%	-0.09%	1.43%	1.89%	1.79%	1.87%				
Orange	-1.99%	-4.86%	-3.33%	0.28%	2.72%	3.49%	3.46%	3.46%				
Riv/SB	-3.80%	-6.00%	-2.43%	0.64%	2.85%	3.87%	3.90%	3.71%				
Ventura	-2.39%	-4.69%	-4.19%	-0.65%	1.79%	2.98%	3.12%	3.10%				

Table 2. A List of Selected Survey Questions and Responses

Survey Questions	Responses
1. How deep the economic recession measured in job losses in the SCAG Region will be and when it might end?	
(1) The economic recession measured in job losses in the SCAG Region will most likely end in: a) 2009 b) 2010 c) 2011 d) 2012 e) Others	2010 (3 respondents); 2011 (7 respondents); 2012 (2 respondents)
(2) What is the likely range of the SCAG Region's unemployment rate for 2020? a) 5%-6% b) 6%-7% c) 7%-8%, d) Others	5% (minimum); 6.5% (median); 8% (maximum)
(3) What is the likely range of the SCAG Region's unemployment rate for 2035? a) 5%-6% b) 6%-7% c) 7%-8%, d) Others	5% (minimum); 6.0% (median); 8% (maximum)
2. After the recession ends, will national job growth be equal to, greater than or less than the U.S. job growth rate from the current US BLS projection? According to US BLS projection released in November 2007, US jobs are projected to grow at an annual average growth rate of 1.04% between 2006 and 2016.	Greater than the U.S. job growth rate from BLS (2 respondents); equal to the U.S. job growth rate from BLS (5 respondents); less than the U.S. job growth rate from BLS (0 respondent)
3. Do you agree that workers will retire later?	Yes (12 respondents)
4. Do you think California's share of U.S. jobs will remain the same, increase or decrease to 2020 and 2035?	
(1) California's share of U.S. jobs for 2020 will be: a) 10.5%-11% b) 11%-11.5% c) 11.5%-12% d) Others	10% (minimum); 11.1% (median); 11.6% (maximum).
(2) California's share of U.S. jobs for 2035 will be: a) 10.5%-11% b) 11%-11.5% c) 11.5%-12% d) Others	9% (minimum); 11.0% (median); 12% (maximum)
5. Do you think the SCAG Region's share of California job growth will remain the same, increase or decrease to 2020 and 2035?	
(1) SCAG Region's share of California jobs for 2020 will be: a) 43%-44% b) 44%-45% c) 45%-46% d) Others	43% (minimum); 44.5% (median); 46.1% (maximum)
(2) SCAG Region's share of California jobs for 2035	42% (minimum); 44.5% (median);

will be: a) 43%-44% b) 44%-45% c) 45%-46% d) Others	46.0% (maximum)
6. Please provide your opinion on the future birth rates (total fertility rates) in the SCAG region. Average total fertility rate for 2000-2005 was 2.1. (1) Average total fertility rate for 2020 will be: a) 1.8-2.0 b) 2.0-2.2 c) 2.2-2.4 d) Others (2) Average total fertility rate for 2035 will be a) 1.8-2.0 b) 2.0-2.2 c) 2.2-2.4 d) Others	 1.8 (minimum); 2.0 (median); 2.4 (maximum) 1.8 (minimum); 1.9 (median); 2.2 (maximum)
7. Should SCAG adopt the life expectancy trends in the new Census Bureau projections?	Yes (9 respondents); No (3 respondents); Others (1 respondent)
8. Should SCAG expect more international immigration in light of the higher Census Bureau projections? International net immigration was assumed to be 125,000 per year. a) Yes b) No	Yes (2 respondents); No (10 respondents); Others (1 respondent)
10. Will the SCAG region experience the same changes in labor force participation rate (retirement) trends that have been discussed for the nation?	Yes (6 respondents); No (2 respondents); Others (1 respondent)

Table 3. Three Alternative Scenarios of Economic Recovery and Employment Projections

Scenario		2010	2015	2020	2035	% Change (2010-2015)	% Change (2015-2020)	% Change (2020-2035)
S09	Low	7,458	8,030	8,526	9,423	1.5%	1.2%	0.7%
S09	Base	7,458	8,192	8,735	9,783	2.0%	1.3%	0.8%
S09	High	7,458	8,501	9,172	10,426	2.8%	1.6%	0.9%
S10-1	Low	7,205	7,757	8,237	9,103	1.5%	1.2%	0.7%
S10-1	Base	7,205	7,914	8,439	9,450	2.0%	1.3%	0.8%
S10-1	High	7,205	8,212	8,861	10,072	2.8%	1.6%	0.9%
S10-2	Low	7,205	8,009	8,526	9,423	2.2%	1.3%	0.7%
S10-2	Base	7,205	8,165	8,735	9,783	2.7%	1.4%	0.8%
S10-2	High	7,205	8,478	9,172	10,426	3.5%	1.6%	0.9%
S10-3	Low	7,205	7,757	8,237	9,423	1.5%	1.2%	1.0%
S10-3	Base	7,205	7,914	8,439	9,783	2.0%	1.3%	1.1%
S10-3	High	7,205	8,212	8,861	10,426	2.8%	1.6%	1.2%

Table 4. Regional Demographic and Economic Assumptions

Assumptions	2010	2015	2020	2035
Total fertility rate	2.1	2.1	2.1	2.1
Crude death rate	6.1	6.2	6.3	7.4
Domestic Migration			TBD	
Immigration*	120,000	120,000	120,000	120,000
Unemployment Rate	12%	8%	7%	5%
Labor force participation rate	61%	61%	61%	58%
Double jobbing rate	4.5%	4.5%	4.5%	4.5%

* Annual

Table 5. Three Alternative Scenarios of Population Projections

Scenario		2010	2015	2020	2035	% Change (2010-2015)	% Change (2015-2020)	% Change (2020-2035)
S09	Low	19,020	19,795	20,684	23,044	0.8%	0.9%	0.8%
S09	Base	19,020	20,124	21,111	23,790	1.2%	1.0%	0.8%
S09	High	19,020	20,748	21,998	25,128	1.8%	1.2%	0.9%
S10-1	Low	18,936	19,150	20,087	22,378	0.2%	1.0%	0.8%
S10-1	Base	18,936	19,559	20,501	23,098	0.7%	1.0%	0.8%
S10-1	High	18,936	20,163	21,361	24,392	1.3%	1.2%	0.9%
S10-2	Low	18,936	19,682	20,680	23,045	0.8%	1.0%	0.8%
S10-2	Base	18,936	20,068	21,108	23,790	1.2%	1.0%	0.8%
S10-2	High	18,936	20,702	21,997	25,128	1.9%	1.3%	0.9%
S10-3	Low	18,936	19,150	20,087	23,051	0.2%	1.0%	1.0%
S10-3	Base	18,936	19,559	20,501	23,796	0.7%	1.0%	1.1%
S10-3	High	18,936	20,163	21,361	25,134	1.3%	1.2%	1.2%

Table 6-A. DOF Population Projections   Unit: Thousands

COUNTY	2010	2015	2020	2025	2030	2035
Imperial	190	214	239	262	284	309
Los Angeles	10,515	10,840	11,214	11,593	11,920	12,218
Orange	3,228	3,373	3,520	3,619	3,705	3,781
Riverside	2,239	2,562	2,905	3,205	3,507	3,800
San Bernardino	2,178	2,378	2,581	2,774	2,959	3,133
Ventura	856	905	956	1,004	1,050	1,093
SCAG	19,205	20,272	21,416	22,456	23,425	24,333

Source: State of California, Department of Finance, Population Projections for California 2007.
and Its Counties 2000-2050, July 2007.

Table 6-B. SCAG Preliminary Baseline Population Forecasts   Unit: Thousands

COUNTY	2010	2015	2020	2025	2030	2035
Imperial	202	247	276	298	312	320
Los Angeles	10,616	10,971	11,329	11,678	12,015	12,338
Orange	3,315	3,452	3,534	3,586	3,630	3,654
Riverside	2,243	2,509	2,809	3,090	3,344	3,597
San Bernardino	2,182	2,386	2,583	2,774	2,958	3,134
Ventura	861	900	937	969	996	1,014
SCAG	19,418	20,465	21,468	22,394	23,254	24,056

Source: SCAG, Preliminary Baseline Population Forecasts for Counties
in the SCAG Region 2000-2035, July 2007.

Table 6-C. Difference between DOF Projections and SCAG Forecasts   Unit: Thousands

COUNTY	2010	2015	2020	2025	2030	2035
Imperial	-13	-33	-37	-36	-29	-12
Los Angeles	-101	-131	-115	-84	-95	-120
Orange	-87	-79	-14	32	76	127
Riverside	-4	53	96	115	164	203
San Bernardino	-4	-8	-1	0	1	0
Ventura	-5	5	19	36	54	79
SCAG	-213	-192	-52	62	171	277

Table 6-D. % Difference between DOF Projections and SCAG Forecasts (Difference / SCAG Forecasts)

COUNTY	2010	2015	2020	2025	2030	2035
Imperial	-6.2%	-13.2%	-13.4%	-12.1%	-9.2%	-3.6%
Los Angeles	-1.0%	-1.2%	-1.0%	-0.7%	-0.8%	-1.0%
Orange	-2.6%	-2.3%	-0.4%	0.9%	2.1%	3.5%
Riverside	-0.2%	2.1%	3.4%	3.7%	4.9%	5.6%
San Bernardino	-0.2%	-0.3%	-0.1%	0.0%	0.0%	0.0%
Ventura	-0.5%	0.5%	2.0%	3.7%	5.4%	7.8%
SCAG	-1.1%	-0.9%	-0.2%	0.3%	0.7%	1.2%

Table 6. Forecasting Accuracy of Regional Population and Employment Projections in the SCAG Region: Mean Absolute Percentage Errors as of 2008

	Projection Horizon			
	5 year	10 year	15 year	20 year
Population	3%	5%	9%	11%
Employment	6%	9%	13%	8%
Observations	11	9	7	5

Note: The intermediate years' projections were calculated using the compound growth rate.

Sources: SCAG, SCAG Development Guide - Growth Forecast Selection, Jan. 1974 (SCAG90 adopted in 1972); SCAG, SCAG Development Guide - Growth Forecast Selection, Jan. 1974 (D/E 2a adopted in 1974); SCAG, SCAG-76 Growth Forecast Policy, Jan 1976 (adopted in December 1975); SCAG, SCAG78 Growth Forecast Policy (adopted in January 1979); SCAG, SCAG82 Growth Forecast Policy (adopted in October 1982); SCAG, Growth Management Plan (adopted in February 1989); SCAG, Regional Comprehensive Plan and Guide (adopted in June 1994); SCAG, 1998 RTP Growth Forecast (adopted in April 1998); SCAG, 2001 RTP Growth Forecast (adopted in April 2001); SCAG, 2004 RTP Growth Forecast (adopted in April 2004); SCAG, 2008 RTP Integrated Growth Forecast (adopted in April 2008)

Figure 1. The SCAG Region Map

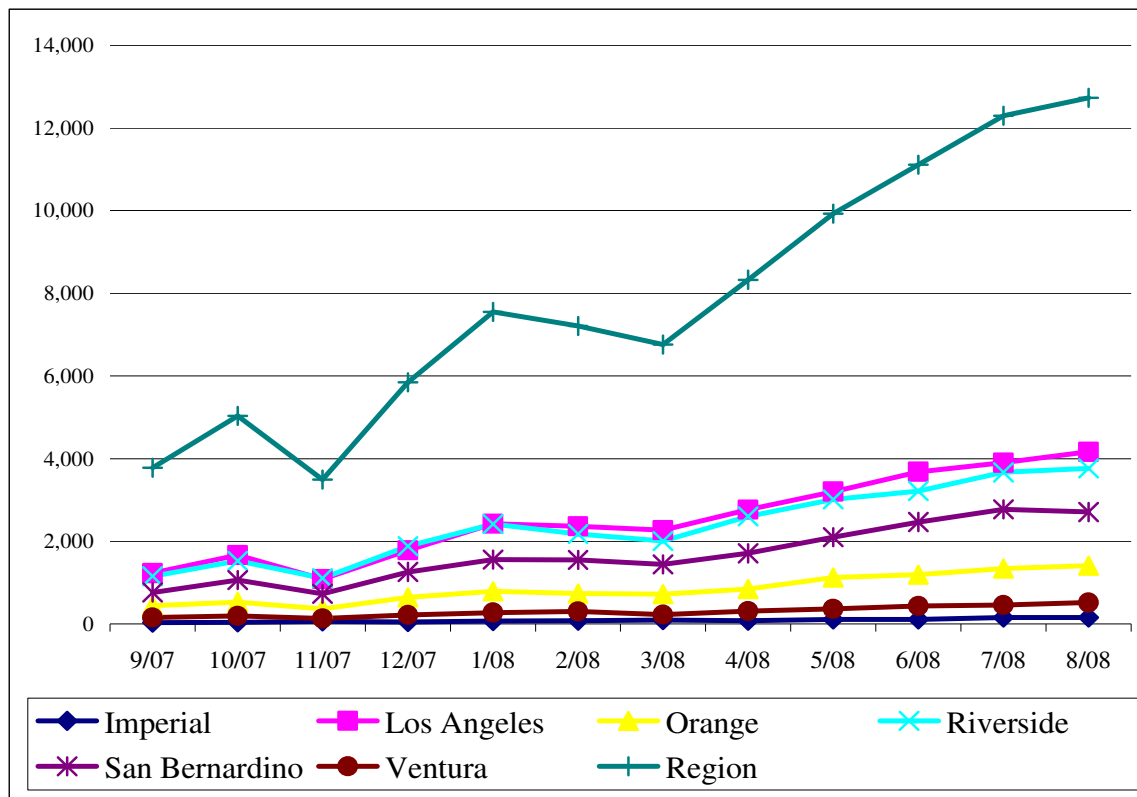Figure 2. Foreclosures by County in the SCAG Region, 7/2007-8/2008

Figure 3. Population Projection Model in an Economic-Demographic Model
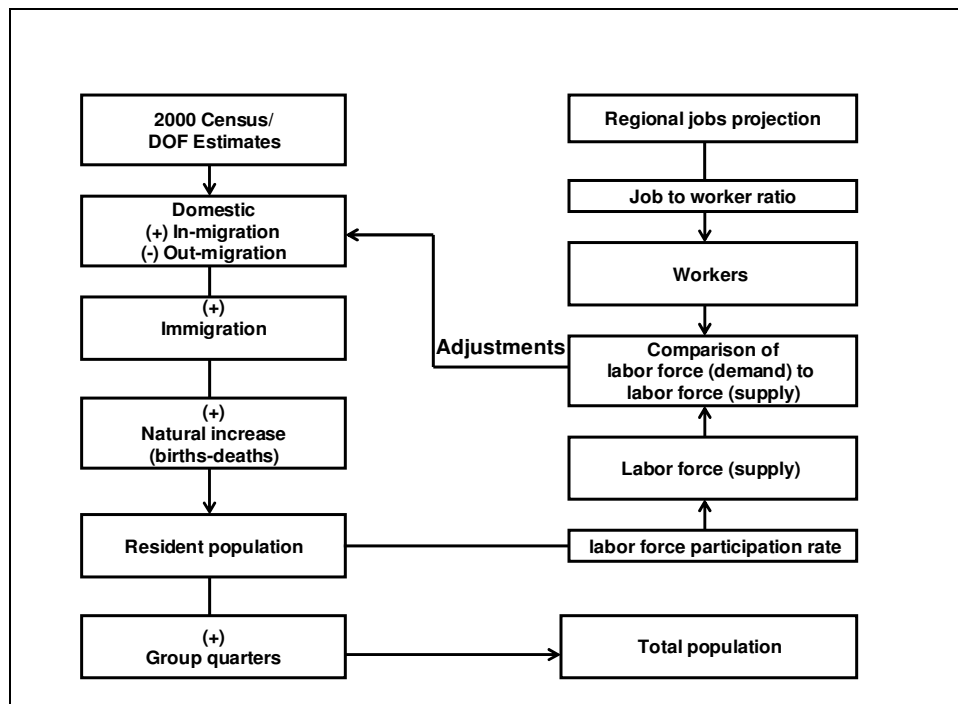
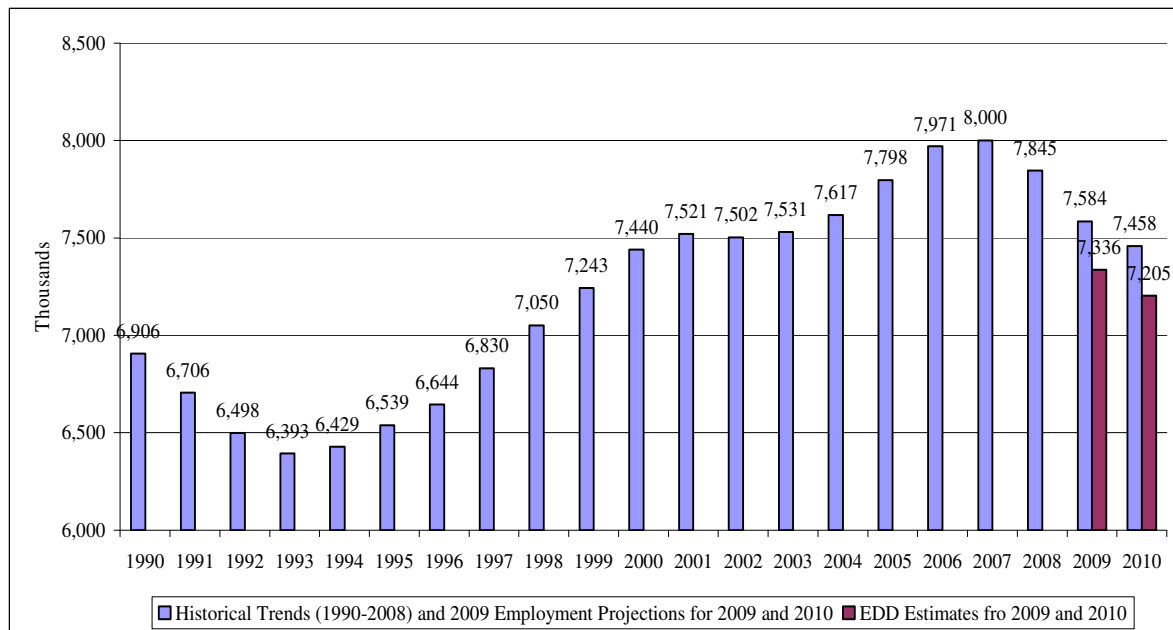Figure 4-A. 2009 Employment Projections and EDD Estimates for 2009 and 2010

Figure 4-B. Annual Growth Rate of 2009 Employment Projections and EDD Estimates for 2008-09 and 2009-2010